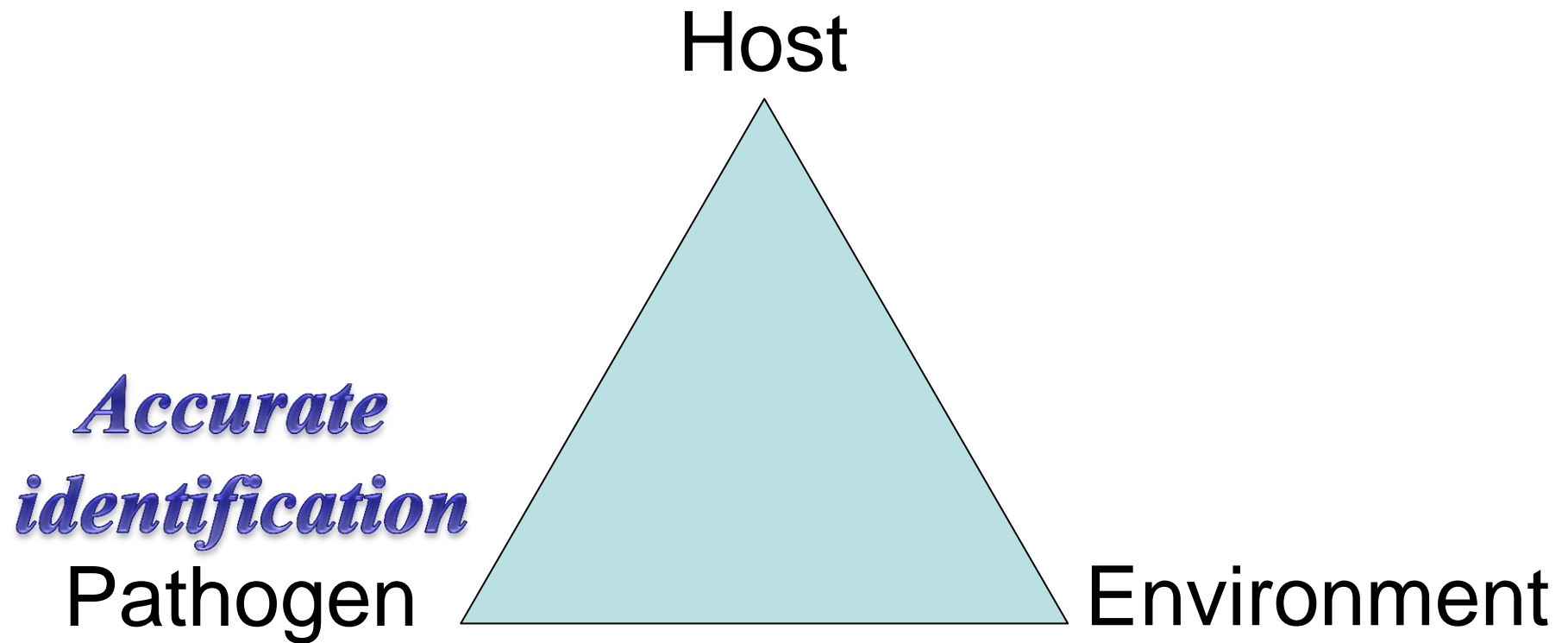


Pulse Crop Disease Diagnostics

Dr. Mary Burrows, Dr. Bright Agindotan
Montana State University
Plant Sciences and Plant Pathology Department

Why are diagnostics important to you?





Schutter Diagnostic Lab

- Identify plant diseases, insects, weeds/plants, mushrooms, toxic molds, etc.
- Provide management recommendations
- Education and outreach on plant pests
- Process approximately 2000 samples/yr (~50% homeowner/horticulture)

<http://diagnostics.montana.edu>



Schutter Diagnostic Lab

What do you need help with?

Plant Disease	Insects	Plant Identification
Instructions PDF	Instructions PDF	Instructions PDF
Form PDF	Form PDF	Form PDF
Contact Eva Grimme , PH.D. Plant Pathology Diagnostician P: (406) 994-5150 E: eva.grimme@montana.edu	Contact Laurie Kerzicnik , PH.D. Associate Extension Specialist P: (406) 994-5704 E: lauren.kerzicnik@montana.edu	Contact Noelle Orloff Plant Identification Diagnostician P: (406) 994-6297 E: noelleorloff@montana.edu
More information	More information	More information

[Submit sample via PDIS](#)



Stack the deck in your favor.

2016 Pulse Crop Calendar



Northern
Pulse Growers
Association



MONTANA
STATE UNIVERSITY

EXTENSION

NDSU EXTENSION
SERVICE

Regional Pulse Crop Diagnostic Laboratory

- Objective 1. Develop a regional diagnostic laboratory for pulse crops (chickpea, lentil, dry pea) disease diagnostics.
- Objective 2. Monitor pulse crops for pathogens of interest including new diseases.
- Objective 3. Develop robust laboratory and in-field diagnostic methods for regulatory pests.
- Objective 4. Distribute information to growers on detecting pests of interest, and put diagnostic techniques into use through county extension agents and diagnostic laboratories.



www.mtagalert.org

Agalerts by email or fax

Mary Burrows

994-7766

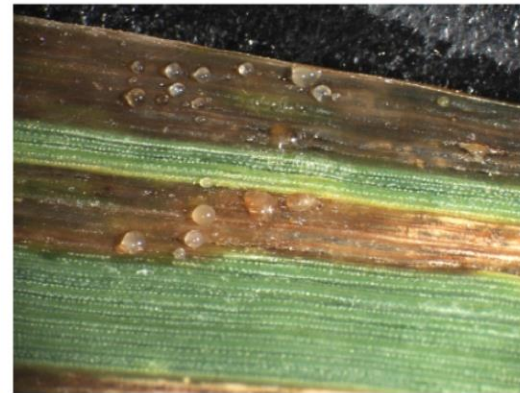
mburrows@montana.edu

Fax: 994-7600

Name, fax, phone no.

Cropland disease. Bacterial leaf streak and black chaff common in Montana wheat. (18 July, 2011).

I've been seeing quite a bit of bacterial leaf streak throughout the state. This is a seedborne disease and is showing up due to high humidity and hail events. It is easily confused with fungal diseases such as septoria. Fungicides are not effective against bacterial diseases. The way you can distinguish the bacterial and fungal diseases is that the bacterial leaf symptoms are more shiny/slick, they often cause tearing/shredding at the tip of the flag leaf, the symptoms generally occur in long lines, and sometimes if it's been moist or irrigated, the bacteria ooze out of the leaf. If it's later in the day you'll see crusty white flecks where the ooze dried. If you want to distinguish for yourself between bacterial and fungal leaf streaks, you can put some leaves in a Tupperware with very wet paper towels overnight. The next day you'll see cloudy little beads of bacteria on the leaf, like this:



Droplets of bacteria oozing out of a leaf

NDSU just put out a nice publication on bacterial leaf streak and black chaff at <http://www.ag.ndsu.edu/pubs/plantsci/smgrains/pp1566.pdf>

I've included more pics below, and as always, call if you have questions.

—Mary Burrows (599-9966, mburrows@montana.edu)

New pests of pulse crops in Montana, 2013-2015

- Anthracnose on lentil
- Botrytis on chickpea and pea
- Stemphylium blight on lentil and chickpea
- Fusarium wilt on pea
- Unknown viruses in pea
- Rust on vetch/lentil



Montana Ascochyta seed testing

Levels of seedborne Ascochyta in pulse crop samples submitted to the MSU Schutter Diagnostic Laboratory, 2009-2014 (thru 12/01/14).

Chickpea					Pea				Lentil			
Crop yr	n	% above threshold	% with Asc	avg %	n	% above threshold	% with Asc	avg %	n	% above threshold	% with Asc	avg %
2009	2	0	0	0.0	57	0	26	0.2	25	0	12	0.1
2010	4	25	25	0.8	83	10	65	1.7	53	15	43	0.3
2011	14	43	43	0.5	107	3	85	1.8	163	12	47	4.0
2012	19	74	74	0.8	149	11	74	1.8	149	6	41	1.8
2013	14	7	7	0.0	84	4	71	1.1	24	4	42	1.2
2014	35*	26	26	0.8	223	5	68	1.1	54	12	20	1.4
2015	14		21		76		75		39		28	

n = number of samples submitted for testing. A test consists of 500 seeds except 2012 chickpeas = 600 seeds

% above threshold = % of samples above the threshold for ascochyta (0% chickpea, 5% pea and lentil)

% with Asc = % of samples with 1 seed or more with Ascochyta

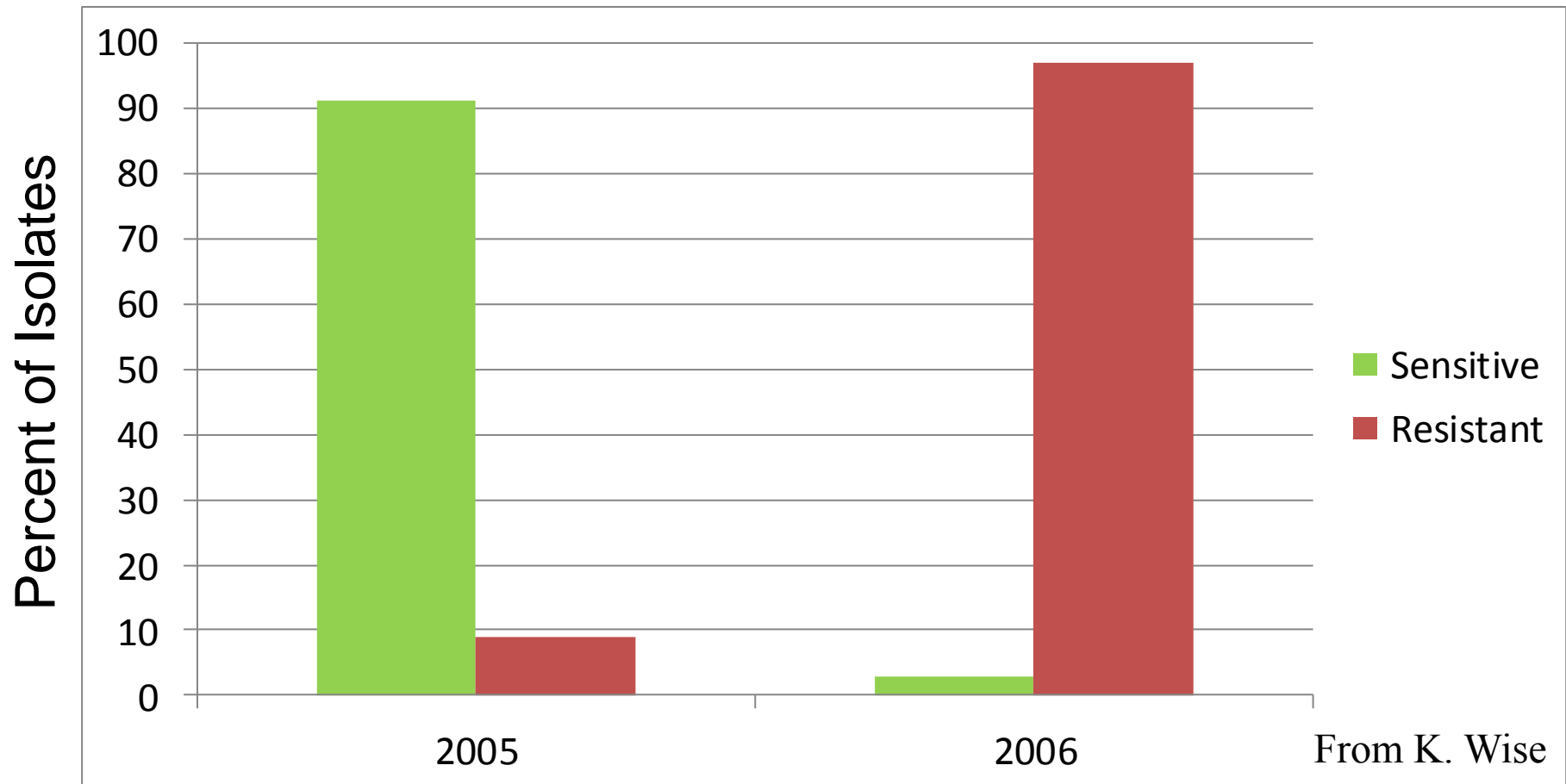
avg % = the average % of ascochyta in all seed samples tested

*in 2014, 13 samples from WA and NE were included in this dataset

Fungicide resistance in *Ascochyta* blight

- 145 isolates were collected from the 2013 crop year
 - 4 chickpea and 1 pea isolate were insensitive (resistant) to Headline
 - One chickpea isolate was insensitive to Xemium
 - One chickpea isolate was insensitive to Boscalid
 - Resistance testing for Proline is ongoing
- No resistance identified from 2014 crop year thusfar
- 2015 crop year: still collecting isolates from seed submissions and testing, developing molecular assay (40 samples, 280 isolates)

Ascochyta resistance to Headline/Quadris (strobilurins)



PSPP Home

Regional Pulse Crop
Diagnostic Laboratory

Who We Are

Why Test Seeds?

Seed Sampling

Sample Submission

Pathogen Tests

Important Seedborne
Diseases of Pulse Crops
Germination, Purity, etc. -
Tests by Montana State Seed
Testing Lab

Other Tests

Links to Pulse Grower's
Associations

For questions related to pulse
crop pathogen testing or our
website, contact:

Bright O. Agindotan
Regional Pulse Crop Diagnostic
Laboratory
P.O. Box 173150
Department of Plant Sciences &
Plant Pathology
Montana State University
Bozeman, MT 59717-3150

Tel: 406-994-5162
Fax: (406) 994-3786
pulse@agnostics@montana.edu

For questions related to basic
seed testing, contact:

The Montana State Seed
Testing Laboratory
PO Box 173145
Room 40 Marsh Lab
Bozeman, MT 59717-3145
Phone: (406) 994-2141
Fax: (406) 994-3786

REGIONAL PULSE CROPS DIAGNOSTIC LABORATORY

Department of Plant Sciences & Plant Pathology
Bozeman, Montana

Web: <http://plantsciences.montana.edu/pulsecrop-diagnostic-lab/>

Healthy Seeds, Healthy Start



We test your pulse crops for pests.



Fungal Scan: \$200

We scan for economically important eight seedborne fungi, including Ascochyta.

Smart Package: \$400

It includes the fungal scan and test for two major viruses.

Individual Pathogen tests

We scan for individual bacteria, fungi, nematode, phytoplasma, and viruses.

<http://plantsciences.montana.edu/pulsecropdiagnosticlab/>

Monitor pulse crops for pathogens of concern including new and/or emerging diseases.

Tests (July-Nov., 2015)	No of Seed Samples	State Distribution
Nematodes (Stem nematodes: <i>Ditylenchus</i> spp. Pea cyst nematodes: <i>Heterodera</i> spp)	598	Montana: 510 (85%) Minnesota: 22 (4.4%) Texas: 4 (0.8%) Oregon: 8 (1.6%)
Ascochyta tests	118	Montana (100%)
Fungal scan	19	Montana (100%)
Smart Package	16	Montana (100%)

Monitor pulse crops for pathogens of concern including new and/or emerging diseases.

Pathogen	% Samples Infected (n=100)
<i>Ascochyta</i> spp.	43
<i>Alternaria</i> spp.	67
<i>Cladosporium</i> spp.	65
<i>Fusarium</i> spp.	20
<i>Stemphylium</i> spp.	13
<i>Botrytis</i> spp.	12
<i>Sclerotinia</i> spp.	3
Bacteria	49

Develop robust laboratory and in-field diagnostic methods for regulatory pests.

Multiplex PCR

- BLRV
- PSbMV
- BYMV
- PMV
- CMV

Uniplex PCR

- All multiplex viruses
- RCVMV
- PSV
- CIYVV
- PeBV
- PSeV
- PEMV

Other tests

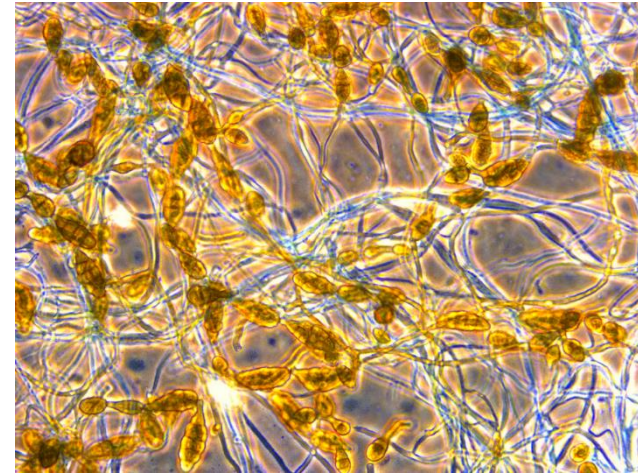
- Bacterial blight dome test
- Nematodes
- Aster yellows

Fungi of concern in seed

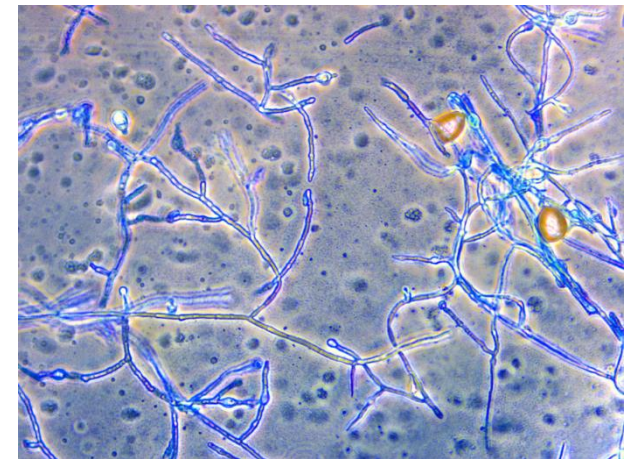
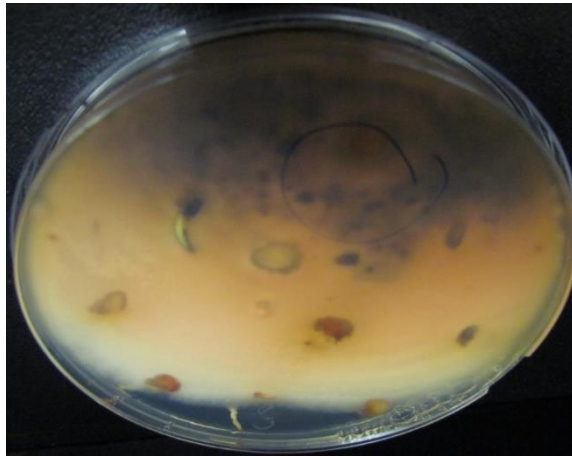
- Spread in seed to new areas: neighbors, globally
- New isolates and mating types
- Phytosanitary regulations

Alternaria spp.

Pathogen diversity,
pathogenicity?



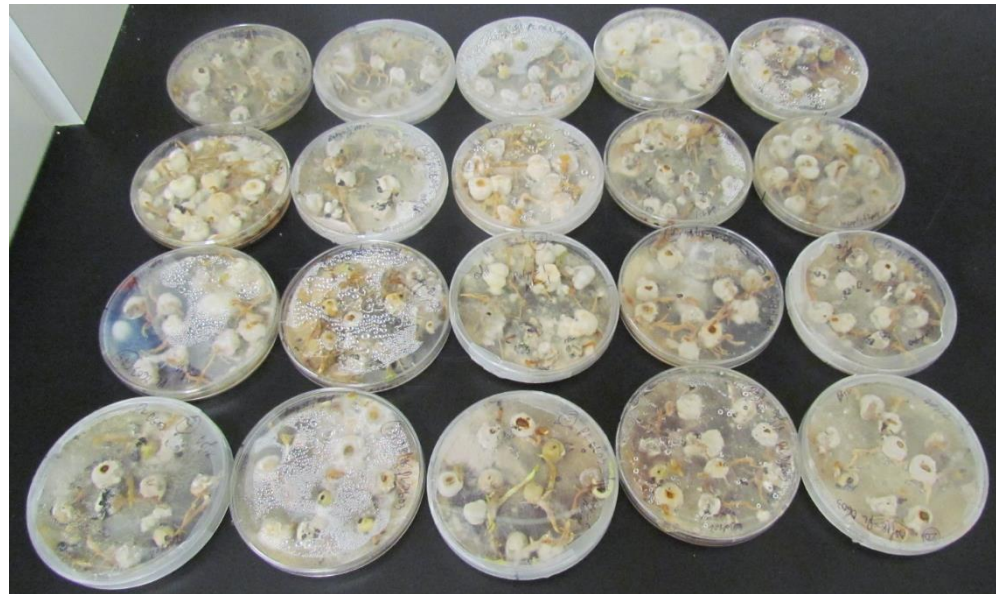
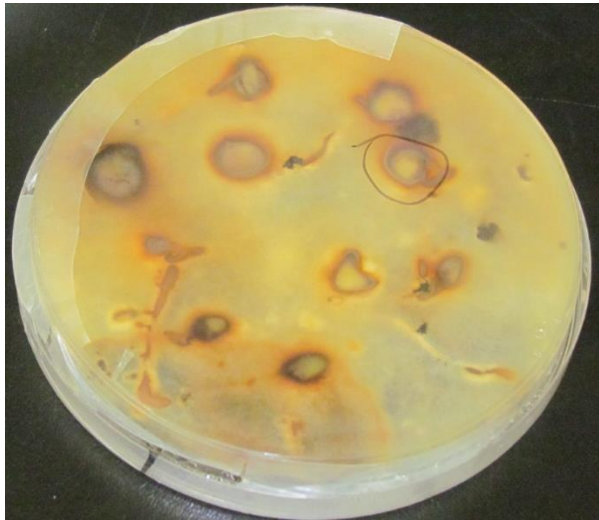
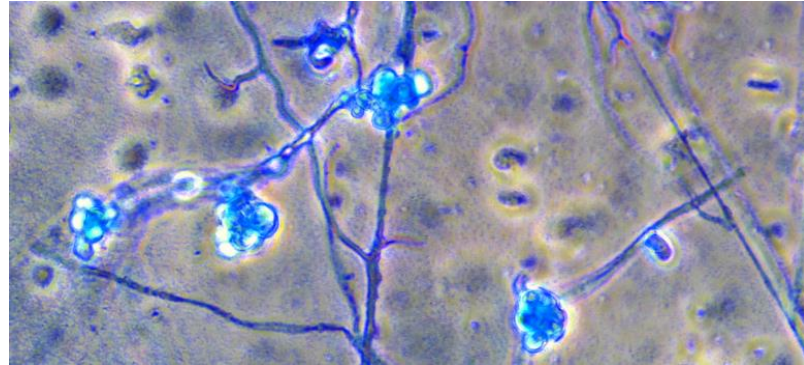
Alternaria alternata



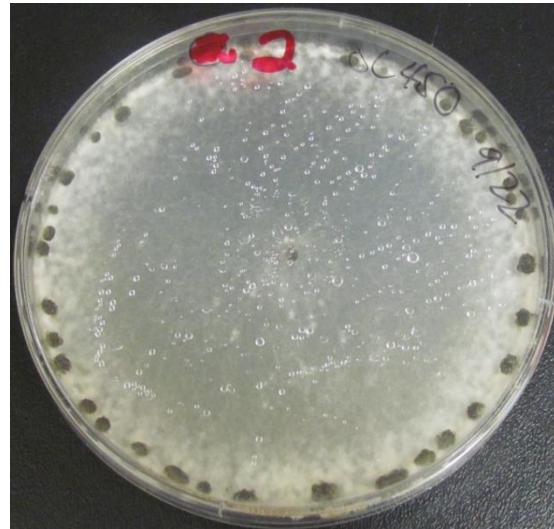
Alternaria infectoria

Botrytis (gray mold) of pea.

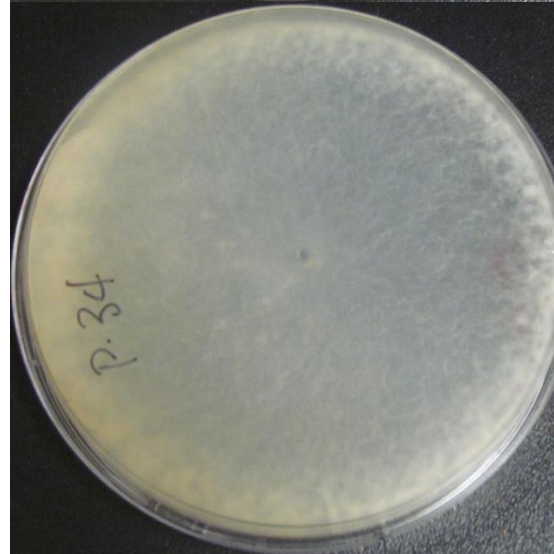
0% Ascochyta but 20% Botrytis



Sclerotinia sp. on pea

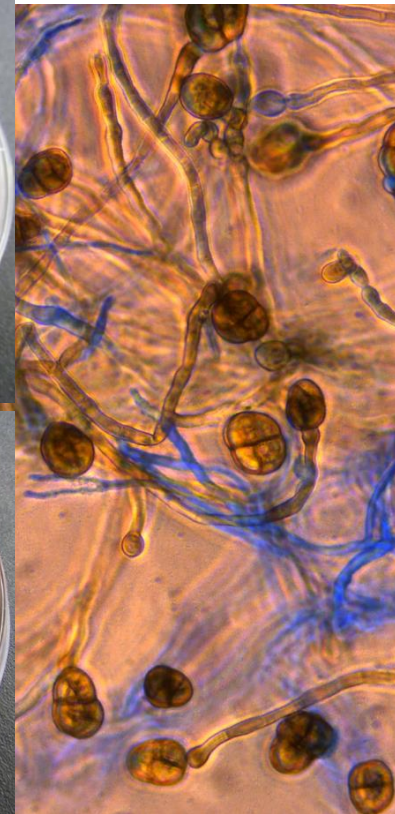
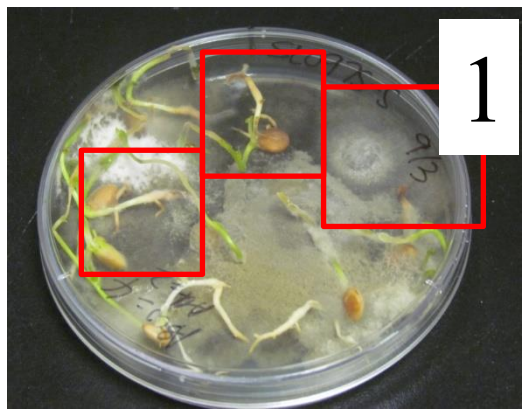


Sclerotinia spp. causes stem rot, or white mold in legumes.



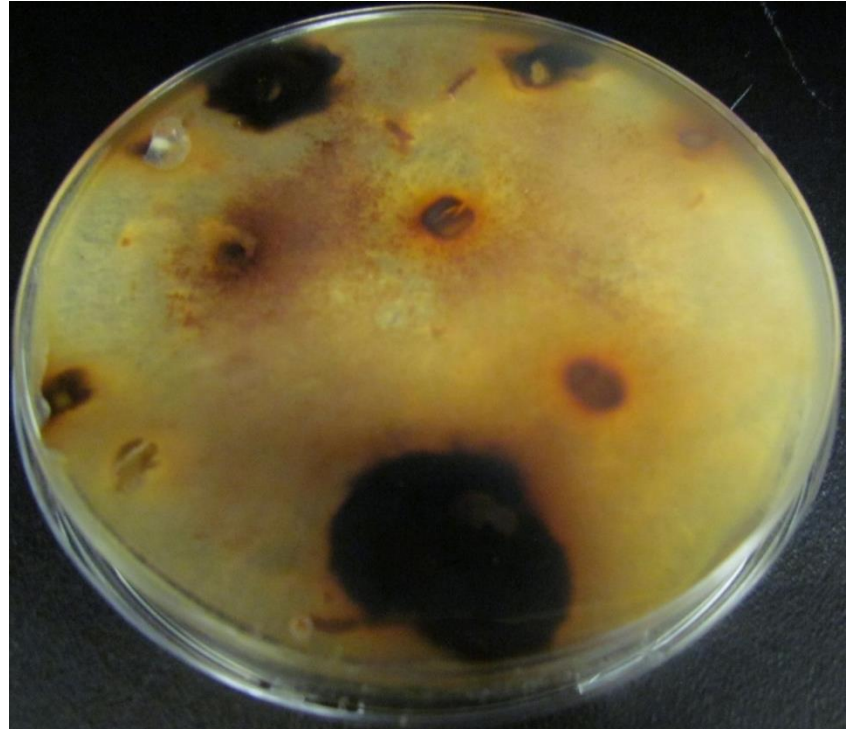
Kills seedlings (left)

Stemphylium spp.



Three different morphologies. 1: *Stemphylium globuliferum*, 2: *Stemphylium vesicarium* (Teleomorph: *Pleospora herbarum*); 3: *Stemphylium* spp. (unk.)

Rhizoctonia solani



Causing seedling blight on pea

New detections of seedborne fungi

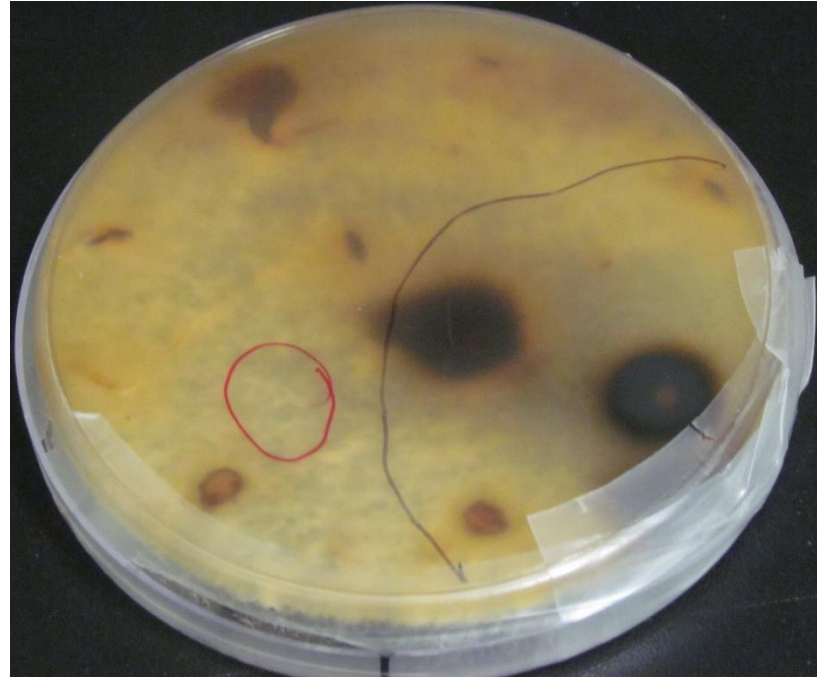
- *Nigospora oryzae* in chickpea
- *Microsphaeresis* spp.
- *Peziza* spp.
- *Arthrinium* spp. in pea.
- *Bipolaris* spp. (leafspotting fungi)

Aureobasidium pullans



Biocontrol
agent?


Diaporthe spp.



Phomopsis seed rot and pod and stem blight of soybean are caused by a complex of three different fungi including *Diaporthe phaseolorum* var. *sojae*, *Diaporthe phaseolorum* var. *caulivora*, and *Phomopsis longicolla*

What Next?

- Survey of Montana for pathogens of pulse crops (SCBG)
- Develop a molecular assay for fungicide resistance (SCBG)
- Pest Management Strategic Plan for peas and western region pulse crop working group for pulse crops; focus on sustainable funding for RPCDL (submitted, WRIPMC)
- Pathogenicity assays for 'new' fungi
- Seed treatment trials with infected seed
- Information for breeding efforts (new breeder, 2016?)

A photograph of two men standing in a vast, green lentil field under a bright blue sky with scattered white clouds. The man on the left, wearing a checkered shirt and khaki pants, holds a small, yellowed plant stem. The man on the right, wearing a light yellow polo shirt and blue jeans, holds a larger, healthy green plant. The field is filled with rows of green lentil plants, and the horizon is flat and distant.

Diseased lentil

Healthy lentil